Is the NICE traffic light system fit-for-purpose for children presenting with undifferentiated acute illness in primary care?

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Abstract

Background

The NICE traffic light system uses children's symptoms and signs to categorise acute infections into red, amber and green. To our knowledge, no study has described the proportion of children with acute undifferentiated illness who fall into these categories in primary care, which is important since red and amber children are considered at higher risk of serious illness requiring urgent secondary care assessment.

Aim

To estimate the proportion of acutely unwell children presenting to primary care classified by the NICE traffic light system as red, amber or green, and to describe their initial management.

Design and setting

Secondary analysis of the Diagnosis of Urinary Tract infection in Young children (DUTY) prospective cohort study.

Method

6,797 children under five years presenting to 225 General Practices with acute undifferentiated illness were retrospectively mapped to the NICE traffic light system by a panel of GPs.

Results

6,406 (94%) children were classified as NICE red (32%) or amber (62%) with 1.6% red and 0.3% respectively referred the same day for hospital assessment; and 46% and 31% respectively treated with antibiotics. The remaining 385 (6%) were classified green, with none referred and 27% treated with antibiotics. Results were robust to sensitivity analyses.

Conclusion

The majority of children presenting to UK primary care with acute undifferentiated illness meet red or amber NICE traffic light criteria,with only 6% classified as low risk, making it unfit for use in General Practice. Research is urgently needed to establish as triage system suitable for general practice.

Keywords: paediatrics; infections; family practice; primary health care; general practice; fever

What is known about this topic

The NICE traffic light system is promoted for use in primary and secondary care. It has been validated only in secondary care where serious illness is more prevalent. There have been no studies validating the use of the NICE traffic light system in UK primary care. Additionally, the incidence and management of children presenting to UK general practice categorised according to the NICE traffic light system is unknown.

What this study adds:

This secondary analysis of a large representative study shows the vast majority of children presenting to UK general practices with acute undifferentiated illnesses are classified as red or amber. We conclude that the NICE traffic light system is unfit for use in general practice, and that further research is urgently needed to develop and validate paediatric triage tools for use in this setting.

Background

Children account for up to 25% of all consultations in primary care (1). Identifying unwell children can be difficult as symptoms are often non-specific; there is an element of uncertainty due to communication difficulties with young children and the incidence of serious illness is low in primary care (2).

It is important to be able to identify children who are at risk of a serious infection to avoid delay in treatment. The traffic light system was initially developed in the National Institute of Clinical Excellence (NICE) (2007) guideline 'Fever in under 5s: assessment and initial management' and updated in 2019 (3). The system categorises signs and symptoms so that clinicians can determine whether children are at 'low risk' (green); 'moderate risk' (amber) or 'high risk' (red) of serious illness. It was based on the Yale Observation Scale (4) and evidence based reviews to identify symptoms and signs and the likely presence of any serious illness. Understanding the incidence of the risk categories in primary care is important in determining the burden of disease in this population.

It is important to understand how children are being managed, and what proportion of children are referred for hospital assessment. The NICE guidelines (3) say that children categorised as 'red' should be referred for clinical assessment by a paediatric specialist. For children categorised as 'amber', GPs should use clinical judgement to decide whether children should be referred to hospital. Often it is difficult for GPs to decide which cases can be safely managed at home. Unpicking the cases to see the features that are most associated with admission and identification of serious illness is important.

Several studies have examined the NICE traffic light system in Emergency Departments (5,6). However, we could find no studies describing the incidence and management of children presenting to UK general practice categorised with NICE traffic light system. In the NICE guideline (3), a panel member conducted a survey of 157 consultations with children under five in a GP practice in England to explore the incidence of red or amber features for children presenting with fever. Out of 157 consultations, 31 had amber features. No red

features were recorded. 6 of these children were referred to the paediatric assessment unit for specialist advice.

The use of the NICE traffic light system in general practice has been criticised as the research was based on hospital populations with a higher proportion of serious bacterial infections (7). The predictive value of the system in a UK general practice population with low risk of serious bacterial illness remains unknown.

The aim of this study was to describe the proportion of children presenting with acute illness to UK general practice who would be classified as red, amber or green by the NICE traffic light system and determine the initial management of children.

Methods

Study design and population

We analysed data from a cohort of children from 'The DUTY study' (8). DUTY (the Diagnosis of Urinary Tract infection in Young children) study was a multicentre, prospective observational study that recruited children under the age of 5 who were being assessed in primary care for an acute, undifferentiated, non-traumatic illness of less than 28 days duration. Children were recruited from 233 primary care sites (GP surgeries, walk-in centres and emergency departments) in England and Wales. Full details of the study have been published elsewhere (8,9). The majority (6797, 94.9%) of children were recruited from general practices with 4.0% from children's EDs and 1.1% from walk-in-centres. The study was designed to investigate the diagnostic features of UTI in young children in primary care but recruited children who were generally unwell as well as those with a possible UTI. The children were recruited for the study between 2010 and 2012.

Children were included in DUTY if they were under the age of 5 years; had presented with an acute (≤28 days) illness and with at least one 'constitutional' symptoms or sign as a potential marker for UTI (lethargy/malaise/vomiting/irritability/poor feeding and failure to thrive) or urinary symptom. We included all children with acute illness in this study as we felt

it represented what general practitioners would see in usual practice. Children were excluded if consent was not obtained; illness was longer than 28 days duration; they had taken any antibiotics in the previous 7 days; had a history of known bladder problems; were on immunosuppressant medication or had already been recruited into the study. For this study, we excluded the children who had presented to ED or walk-in centres.

Data collection

107 data points were recorded on a standardised report form. Information recorded included parent-reported symptoms; and signs gathered from a full clinical examination. This included the treating clinician's working diagnosis, initial management and whether the child was referred for immediate assessment in hospital.

Mapping exercise

Prior to analysis of the data, a panel of four clinicians studied the variables from the DUTY data together with the variables in the NICE traffic light system to map which DUTY variables could be used to determine NICE Traffic light status. Both sets of variables were predetermined. If all four clinicians could not reach an agreement that a DUTY variable could be used to accurately represent a NICE Traffic light variable, this variable was removed from the analysis. See table 1.

Table 1*: Mapping of the NICE traffic light system to DUTY variables.*

	Signs and symptoms	
	NICE Traffic Light guidelines	**DUTY**
COLOUR (of skin, lips or tongue)	Normal colour	General appearance = normal
	Pallor reported by parent/carer	*Could not be mapped to a DUTY variable*
	Pale/mottled/ashen/blue*	Abnormal appearance + Pallor
A C TI	Responds normally to social cues*	Child 'not themselves'=No problem

	Signs and symptoms	
	NICE Traffic Light guidelines	**DUTY**
	Not responding normally to special clues*	Child 'not themselves'=Slight/Moderate problem
	No response to social cues*	Child 'not themselves'=Severe problem
	Content/smiles	*Could not be mapped to a DUTY variable*
	No smile	*Could not be mapped to a DUTY variable*
	Stays awake or awakens quickly*	Conscious level=Normal
	Wakes only with prolonged stimulation*	Conscious level=Drowsy
	Does not wake or if roused does not stay awake*	*Could not be mapped to a DUTY variable*
	Appears ill to a healthcare professional*	Global impression of the child >=5
	Strong normal cry/not crying	Child 'not themselves'=No problem
	Decreased activity*	Child 'not themselves'=Slight/Moderate problem
	Weak, high pitched or continuous cry*	Conscious level =Irritable
RESPIRATORY	Nasal flaring	Nasal Flaring=yes
	Tachypnoea: Respiratory rate>50 breaths/minute, age 6-12 months	RR>50 and age in months>=6 and <=12
	Tachypnoea: Respiratory rate>40 breaths/minute, age >12 months	RR>40 and age in months>12
	Tachypnoea: Respiratory rate>60 breaths/minute	RR>60
	Oxygen saturations ≤95% in air	O_2 saturation ≤95%
	Crackles in the chest	Crackles=yes
	Grunting	Grunting=yes
	Moderate or severe chest indrawing*	*Could not be mapped to a DUTY variable. No consensus could be agreed with the clinicians*
CIRCULATION	Normal skin and eyes	Hydration=Normal
	Reduced skin turgor*	Hydration=Severe dehydration

	Signs and symptoms	
	NICE Traffic Light guidelines	**DUTY**
	Moist mucous membranes*	Hydration=Normal
	Dry mucous membranes*	Hydration=Some dehydration
	Tachycardia: >160 beats/minute, age <12 months	Pulse rate >160 and age <12 months
	Tachycardia: >150 beats/minute, age 12-24 months	Pulse rate >150 and age 12-24 months
	Tachycardia: >140 beats/minute, age 2-5 years	Pulse rate >140 and age >2 years
	Capillary refill time (CRT): ≥3 seconds*	Capillary refill time=2-5 seconds and >5 seconds
	Poor feeding in infants* *An infant is defined in the guidelines as under 12 months*	Refused feeds/eating less than normal = moderate/severe problem and age<12m
	Reduced urine output	*Could not be mapped to a DUTY variable*
OTHER	Age <3 months, temperature ≥38ºC	Age <3 months and temperature ≥38ºC
	Age 3-6 months, temperature ≥39ºC	Age ≥3 and ≤6 months and temperature ≥39ºC
	Fevers for ≥5days	*Could not be mapped to a DUTY variable*
	Rigors*	*Chills or shivering (parent reported). Could not reach a consensus with clinicians*
	Swelling of a limb or joint	*Could not be mapped to a DUTY variable*
	Non-weight bearing limb/not using an	*Could not be mapped to a DUTY*

	Signs and symptoms	
	NICE Traffic Light guidelines	**DUTY**
	extremity	*variable*
	Non-blanching rash	*Could not be mapped to a DUTY variable*
	Bulging fontanelle	*Could not be mapped to a DUTY variable*
	Neck stiffness	*Could not be mapped to a DUTY variable*
	Status epilepticus	*Could not be mapped to a DUTY variable*
	Focal neurological signs	*Could not be mapped to a DUTY variable*
	Focal seizures	*Could not be mapped to a DUTY variable*

**discussed and agreed with clinician group*

Children were categorised into the following traffic light:

- Red=high risk if the child had at least one red criteria.
- Amber=intermediate risk if the child had at least one amber criteria and no red criteria.
- Green =low risk if the child had no amber or red criteria
- Child not examined/missing.

Twenty-nine (64%) of the forty-five NICE traffic light signs and symptoms were mapped to DUTY study variables. Fourteen (31%) NICE traffic light variables could not be directly

mapped to DUTY study variables (7 red, 6 amber and 1 green). These were mainly related to neurological or orthopaedic pathology. Two (4%) variables could not be matched because the panel of clinicians couldn't agree that the mapping was an accurate reflection of the NICE variable.

In order to ensure that mapping was appropriate, as a sensitivity analysis we used stricter categorisation of children:

- Red =high risk if the child had two or more red criteria.
- Amber = intermediate risk if the child had one red, or at least two amber criteria.
- Green = low risk if the child had 1 amber or no red or amber criteria).

Analysis

Descriptive statistics were used to characterise the children (numbers (proportion), mean (standard deviation) or median (25^{th} to 75^{th} centiles). Logistic regression models were run to examine associations between traffic light category categorisations and both treatment with antibiotics and referral to hospital for same day assessment. These models were re-run using the stricter categorisation of children for the sensitivity analysis. Parameter estimates are shown as odds ratios (ORs) and 95% confidence intervals (CIs).

IBM Statistics (SPSS version 25) was used to analyse the data.

Results

Within the study period (April 2010 to April 2012), 6,797 (94.9%) children under the age of five presented to general practice and were included in the analysis. Table 2 shows the number of children meeting the criteria of the NICE traffic light system.

Table 2: Number of children meeting criteria of the NICE traffic light system

	NICE Traffic Light guidelines	**Total N=6,797**
COLOUR (of skin,	Normal colour	4,615

	NICE Traffic Light guidelines	Total N=6,797
lips or tongue)	Pale/mottled/ashen/blue	599
ACTIVITY	Responds normally to social cues	552
	Not responding normally to social cues	4,912
	No response to social cues	1,317
	Stays awake or awakens quickly	6,591
	Wakes only with prolonged stimulation	74
	Appears ill to a healthcare professional	536
	Strong normal cry/not crying	552
	Decreased activity	4,912
	Weak, high pitched or continuous cry	68
RESPIRATORY	Nasal flaring	5
	Tachypnoea: Respiratory rate>50 breaths/minute, age 6-12 months	163
	Tachypnoea: Respiratory rate>40 breaths/minute, age >12 months	
	Tachypnoea: Respiratory rate>60 breaths/minute	28
	Oxygen saturations ≤95% in air	731
	Crackles in the chest	493
	Grunting	12
CIRCULATION AND HYDRATION	Normal skin and eyes	6,457
	Reduced skin turgor	0
	Moist mucous membranes	6,457
	Dry mucous membranes	267
	Tachycardia:>160 beats/minute, age <12 months	322
	Tachycardia:>150 beats/minute, age 12-24 months	
	Tachycardia:>140 beats/minute, age 2-5 years	
	Capillary refill time (CRT): ≥3 seconds[a]	901
	Poor feeding in infants	750
OTHER	Age <3 months, temperature ≥38ºC	7
	Age 3-6 months, temperature ≥39ºC	8

[a] recorded as ≥2 seconds in CRF

From the 6,797 children, 2,149 (32%) had at least one red flag symptom or sign, 4,257 (62%) had at least one amber (and no red), the remaining 385 (6%) were green, and 6 (0.1%) were missing the mapped DUTY fields to enable a traffic light category. The overriding reason for a red child being classed as such is based on 'response to social cues' (n=1,007), followed by 'pallor' (n=389). An additional 310 (14%) children had 'no response to social cues' in combination with another red symptom or sign. The vital sign variables (temperature, heart rate, respiratory rate, CRT and O_2 saturations) contributed to 35 (0.5%) children being classified as 'red'. See table 3 and appendix 1.

The initial management of children according to traffic light system classification

The most common working diagnosis was upper respiratory tract infection followed by viral infection and then otitis media. A higher proportion of the red category were treated with an antibiotic compared to amber and green categories (46% vs 31% vs 27% respectively), and a similar pattern observed in the proportion of children referred to hospital for same day assessment (1.6% vs 0.3% vs. 0% respectively). Antibiotic prescriptions were statistically significantly higher in the children classified as red when compared to those classified as green (OR=2.33 (95% CI=1.81 to 3.01), p<0.001; Table 3). Forty-one children (1.9%) were referred to hospital for same day assessment; 30 red and 11 amber. Sensitivity and specificity for a referral for same day assessment were 73% and 80% respectively. The most common symptoms that these children had were decreased activity (n=23); low oxygen saturations (n=11), tachycardia (n=9), and prolonged CRT (n=9).

Using a stricter definition of red high-risk symptoms, we found that 6% (n=372) of children were categorised as high risk and 50% (n=3,380) as amber. Similarly, a higher proportion of the red category were treated with an antibiotic and referred to hospital compared to amber and green categories (Table 3). Again, antibiotic prescriptions were significantly higher in the

children classified as red and amber when compared to those classified as green (OR=3.38 (95% CI=2.67 to 4.27), p<0.001 and OR=1.65 (95% CI=1.48 to 1.85), p<0.001 respectively; Table 3). This stricter definition resulted in a higher proportion of those categorised as red or amber referred for same day hospital assessment (6.2% and 0.5% compared to 1.6% and 0.3% respectively). The proportion of children referred for same day hospital assessment was significantly higher in the children classified as red when compared to those classified as green (OR=25.71 (95% CI=10.79 to 61.31), p<0.001; Table 3). Sensitivity for referred for same day assessment was much reduced using this stricter definition (49%) but specificity was higher (95%).

Table 3. Child characteristics, clinical observations on examination and management

All data are n(%) unless otherwise specified

	Green n=385	**Amber n=4,257**	**Red n=2,149**
Age (years)	2.3 (1.3)	1.9 (1.4)	2.0 (1.4)
Gender (% male)	177 (46.0)	2,091 (49.1)	1,062 (49.4)
missing	0	0	0
Respiratory rate (bpm)			
child examined -N (%)	278 (73.2)	3,361 (79.2)	1,747 (81.5)
mean (sd)	25.7 (6.1)	28.2 (7.7)	29.8 (9.6)
child refused to be examined - N(%)	102 (26.8)	883 (20.8)	397 (18.5)
missing	5	13	5
Temperature (degrees Celsius)			
child examined -N (%)	340 (89.5)	4,073 (96.0)	2,047 (95.8)
mean (sd)	36.7 (0.6)	37.0 (0.8)	37.2 (0.9)
child refused to be examined - N(%)	40 (10.5)	169 (4.0)	91 (4.2)
missing	5	13	5
Oxygen saturation (%)			
child examined -N (%)	233 (61.7)	2,287 (65.7)	1,173 (65.7)
mean (sd)	98.0 (1.1)	97.1 (2.3)	97.1 (2.1)
child refused to be examined - N(%)	146 (38.3)	1,457 (34.3)	735 (34.3)
missing	6	14	9
Tachycardia rate (bpm)			
child examined -N (%)	267 (70.3)	3,303 (77.8)	1,681 (78.6)

mean (sd)	110.7 (15.9)	118.3 (19.3)	122.0 (20.2)
child refused to be examined - N(%)	113 (29.7)	944 (22.2)	460 (21.4)
missing	5	10	8
Capillary refill time (seconds)			
child examined -N (%)	307 (80.8)	3,716 (87.5)	1,868 (87.1)
<2 seconds	307 (100.0)	3,146 (84.7)	1,537 (82.3)
2 to 5 seconds	0	567 (15.3)	321 (17.2)
>5 seconds	0	3 (0.1)	10 (0.5)
child refused to be examined - N(%)	73 (19.2)	533 (12.5)	276 (12.9)
missing	5	8	5
Working diagnosis N(%)			
Upper Respiratory Tract Infection	99 (26.0)	1,471 (34.8)	564 (26.4)
Chest infection	5 (1.3)	244 (5.8)	203 (9.5)
Bronchitis	0	15 (0.4)	8 (0.4)
Bronchiolitis	3 (0.8)	51 (1.2)	29 (1.4)
Pneumonia	0	0	5 (0.2)
Exacerbation of asthma	3 (0.8)	34 (0.8)	19 (0.9)
Tonsillitis	8 (2.1)	143 (3.4)	147 (6.9)
Otitis Media	14 (3.7)	363 (8.6)	277 (12.9)
Pharyngitis	2 (0.5)	29 (0.7)	15 (0.7)
UTI	49 (12.9)	251 (6.0)	150 (7.0)
Gastroenteritis	12 (3.1)	202 (4.8)	107 (5.0)
Viral illness	47 (12.3)	661 (15.7)	352 (16.5)
Other no detail provided	126 (33.1)	688 (16.3)	232 (10.9)
Other detail (e.g. UTI, URTI, thrush)	13 (3.4)	40 (1.7)	30 (1.4)
Missing	*4*	*35*	*11*
Referred for same day assessment? N(%)			
Yes	0 (0.0)	11 (0.3)	30 (1.6)
No	339 (100.0)	3,764 (99.7)	1,872 (98.4)
Missing	*46*	*485*	*247*
OR (95% CI)	**	**	**
Treated with antibiotics? N(%)			
Yes	92 (26.8)	1,179 (30.9)	885 (46.1)
No	251 (73.2)	2,634 (69.1)	1,035 (53.9)
Missing	*42*	*444*	*229*
OR (95% CI)	reference	1.22 (0.95 to 1.57)	2.33 (1.81 to 3.01)
Sensitivity analysis*	**Green n=3,039**	**Amber n=3,380**	**Red n=372**
Referred for same day assessment? N(%)			

Yes	7 (0.3)	14 (0.5)	20 (6.2)
No	2,370 (99.7)	2,965 (99.5)	301 (93.8)
Missing	*662*	*401*	*51*
OR (95% CI)	reference	1.83 (0.74 to 4.53)	25.71 (10.79 to 61.31)
Treated with antibiotics? N(%)			
Yes	777 (28.4)	1,193 (39.6)	186 (57.2)
No	1,961 (71.6)	1,820 (60.4)	139 (42.8)
Missing	*301*	*367*	*47*
OR (95% CI)	reference	1.65 (1.48 to 1.85)	3.38 (2.67 to 4.27)

OR = odds ratio; CI = confidence interval

*n=6 (0.1%) were missing the mapped DUTY fields to enable a traffic light category

** prevalence of outcome too small to run model

***The sensitivity analysis increased the threshold for diagnosis of high risk (2 or more red criteria)

Discussion

Summary of main findings

This study describes a large cohort of 6,797 acutely ill children less than five years old presenting to UK general practices. There were 2,175 (32%) with at least one red flag symptom according to the NICE Traffic light system; 4,231 (62%) with at least one amber (and no red), and only 6% were green or uncategorised. Of the children with at least one red symptom or sign, only 1.6% were referred for same day assessment. Of the children with no red symptoms or signs, 0.3% were referred for same day hospital assessment. The sensitivity analysis increased the threshold for diagnosis of high risk (2 or more red criteria) however still identified 372 (6%) children as red (high risk) and 3380 (50%) of children as amber.

Strengths and weaknesses of the study

This is a large cohort with well documented symptoms and signs, including heart rate, respiratory rate, temperature and capillary refill time which are important objective variables in the traffic light system but are infrequently measured in routine general practice (10).

A further strength of this study is that DUTY recruited children with suspected acute infection. The NICE guideline is regarding the assessment of 'febrile children' however we believe that including all acutely ill children is more representative of normal practice and gives a better insight into general practice.

A limitation of this study was that the NICE variables were not prospectively assessed and the DUTY variables did not perfectly match. We may have underestimated the numbers of amber and red as some of the variables could not be mapped to DUTY study variables (e.g. non-blanching rash). The NICE traffic light system was designed for children with no obvious focus of infection, and children considered to have specific infections (e.g. tonsillitis) by GPs were not excluded from our study. However, other studies validating the traffic light system in other settings have not excluded children on this basis (5,6).

Although recruiting acutely ill children, the DUTY study was primarily focused on diagnosis of urinary tract infections (UTI) and this could have led to the GP working diagnosis of UTI being higher than usual. Some acutely ill children may have been excluded if they didn't fit the DUTY inclusion criteria. Very ill children may have been less likely to participate in the study. Immunisation schedules have also changed since the DUTY data was obtained.

Without hospital admission data we could not tell whether the paediatric team admitted the child to hospital or whether there was a diagnosis of serious bacterial infection.

Results in relation to other studies, discussing important differences in results

To our knowledge, this is the only UK study describing the incidence of low, intermediate or high risk of serious infection using the NICE traffic light system in general practice, and much larger than the only other European study which we are aware of.

An Australian retrospective study (5) conducted in an emergency department (ED) (N=15,781) found that 25.8% of children under the age of 5 met the red category of the traffic light system which is similar to our finding of 32%; 46.7% met amber criteria (compared to our 62%) and 27.5% met green criteria (compared to our 6%). We had a

similar proportion of children categorised as red in our study but lower numbers categorised as green. This is surprising as the ED population has a higher prevalence of serious illness.

A prospective validation study in UK ED (n=700) found that 72.6% of children diagnosed with a mild infection had at least 1 amber or red symptom whereas 7.4% of children with a serious infection had no amber or red features (6).

A systematic review (11) concluded that the NICE guideline traffic light system had excellent sensitivity (100%) in a low prevalence setting though specificity was 1.03%. This was based on only one study of 506 children less than 6 years old in Belgian GP out of hours care (12). In this study nearly all the children (99%) had a red or amber sign. Our much larger study, of 6797 children also found a high percentage (94%) of children meeting red or amber criteria in primary care.

Implications for clinicians, policymakers and future research

This study demonstrates high numbers of children who would be classified as red (32%). If guidelines were followed, this would lead to a high number of children referred for same day hospital assessment.

There is a very high proportion of children who meet the amber criteria of the NICE traffic light system (62%). The current guideline advice is that referral for specialist assessment is down to the clinical judgement of the assessing clinician. This makes it is a less helpful guideline for GPs with no direct guidance.

Our study demonstrated a low number of patients (6%) classified as low risk (green) for serious illness in primary care. Primary care however is considered to have a low prevalence of serious illness. Clinical prediction rules should have high sensitivity to identify those who are at risk however there are costs in terms of referral or admission rates to additionally be considered.

Reclassifying the high, intermediate and low risk categories resulted in less children classified as high risk but only identified half of those who GPs sent for same day hospital assessment.

The guideline is complex and many of the symptoms and signs are subjective. We found the most common reason for a child to be classified as high risk (red) was their response to social cues. There may be a lot of variation with how doctors or parents might define this. Similarly with conscious levels, definitions may vary significantly between parents and clinicians. As clinicians, we felt uncomfortable that waking only with prolonged stimulation would only meet amber criteria. This view has been shared (7).

Our research needs to be taken further, linking primary care data with hospital data, to identify which children were admitted to hospital or who re-presented to primary care with serious bacterial illness and relation to traffic light system categories.

Other scoring systems developed for the identification of serious illness in children in other settings should also be validated to see if they would be suitable for use in general practice. If these are not suitable, a new triage system fit for use in UK general practice needs to urgently be developed. Ideally this would be a simple scoring system based on objective measurements, standardised with those used in Emergency Departments and hospital. However, it is essential that any scoring system is validated for use in general practice.

Conclusion

The vast majority of children presenting to UK primary care with acute undifferentiated illness meet amber or red NICE traffic light criteria. The NICE traffic light system is not fit for use as it will over-call the need for hospital assessment.

Ethical approval was granted by the South West Southmead Research Ethics Committee for the DUTY study, ref #09/H0102/64.

There are no competing interests.

Funding statement: This research received no specific grant from any funding agency in the public, commercial or not-for-profit sectors.

Acknowledgements: We would like to thank the clinicians, research team and participants of the DUTY study.

Contributorship statement:

Dr Blyth is the lead author and contributed to the conception and design of the work; data analysis and interpretation; drafting of the article; critical revision of the article and final approval of the version to be published.

Dr Cannings-John contributed to the conception and design of the work; data analysis, drafting of the article and final approval.

Dr Hughes contributed to the conception and design of the work; data analysis and interpretation, drafting, supervision and final approval.

Prof Hay contributed to data collection, critical revision of the article and final approval of the version to be published.

Prof Butler contributed to data collection and final approval of the version to be published.

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